

(a) at thermal equilibrium

(b) tunneling into and from the conduction band under bias

Figure 1. Band diagrams for field emission from diamond cathodes. (a) Unbiased state. (b) Under bias with tunneling into and from diamond's conduction band.

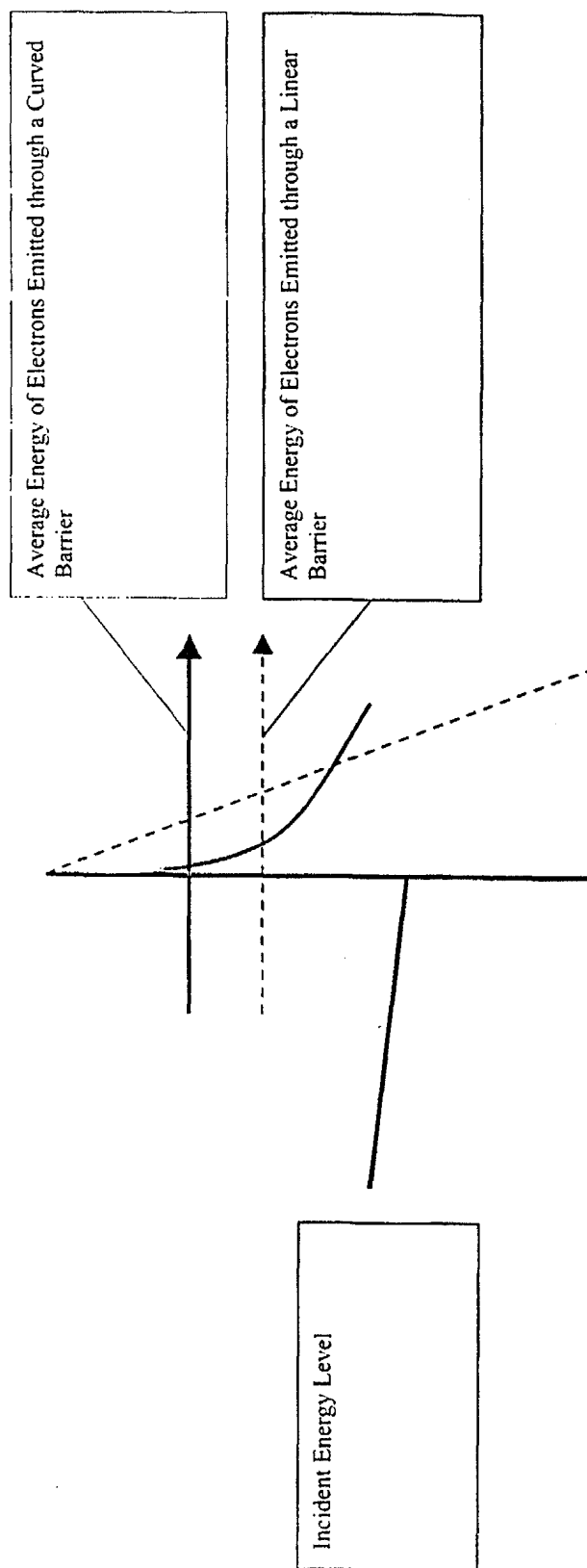


Figure 2. Average electron energies for field emission with and without band bending

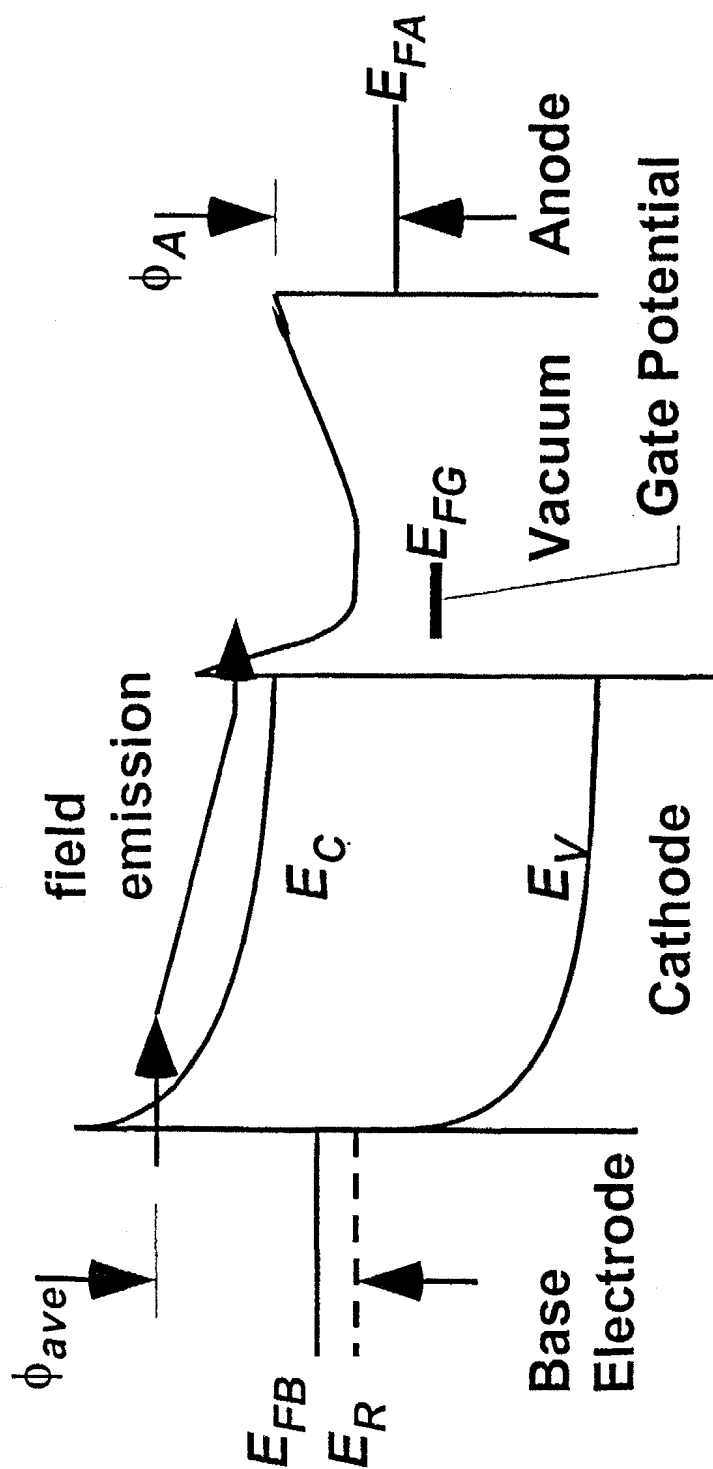


Figure 3. Refrigeration enhancement using a gate electrode. (a) Band diagram for field emission from a gated diamond cathode in the biased state.



Figure 4. Annular gate structure surrounding a diamond-tip emitter cathode.

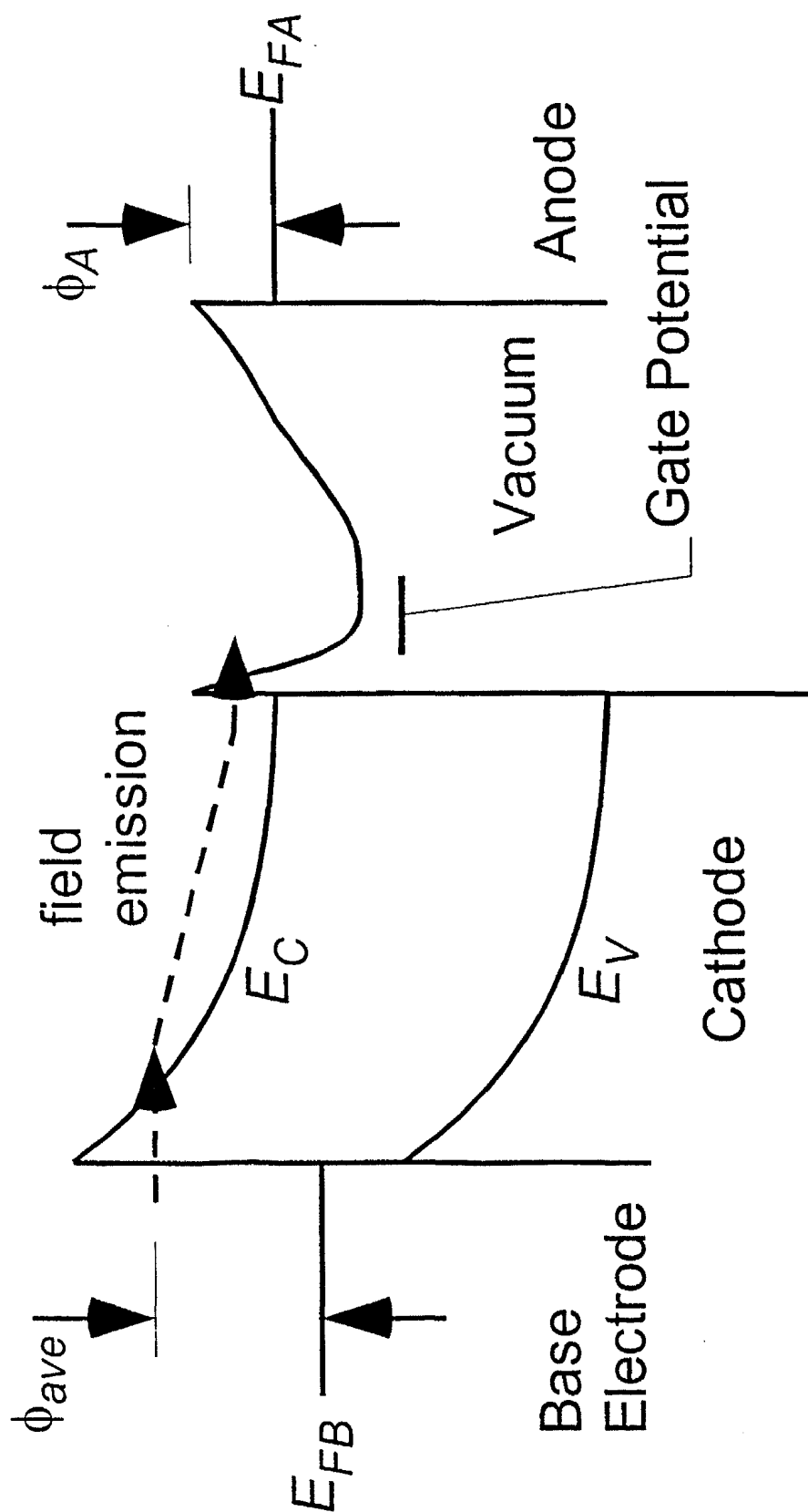


Figure 5. Band diagram for a gated power generation device.

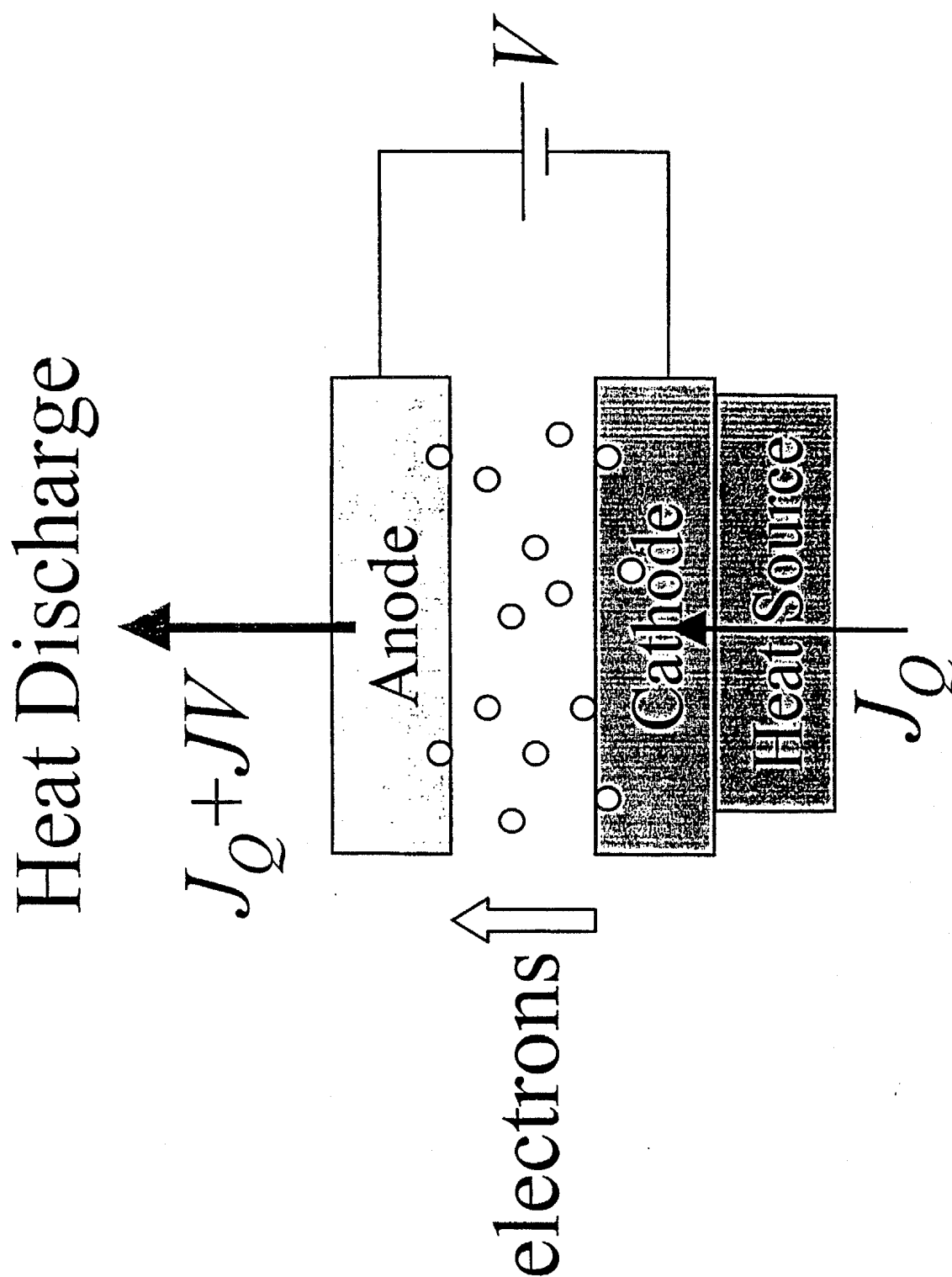


Figure 6. Schematic of a direct refrigeration device.

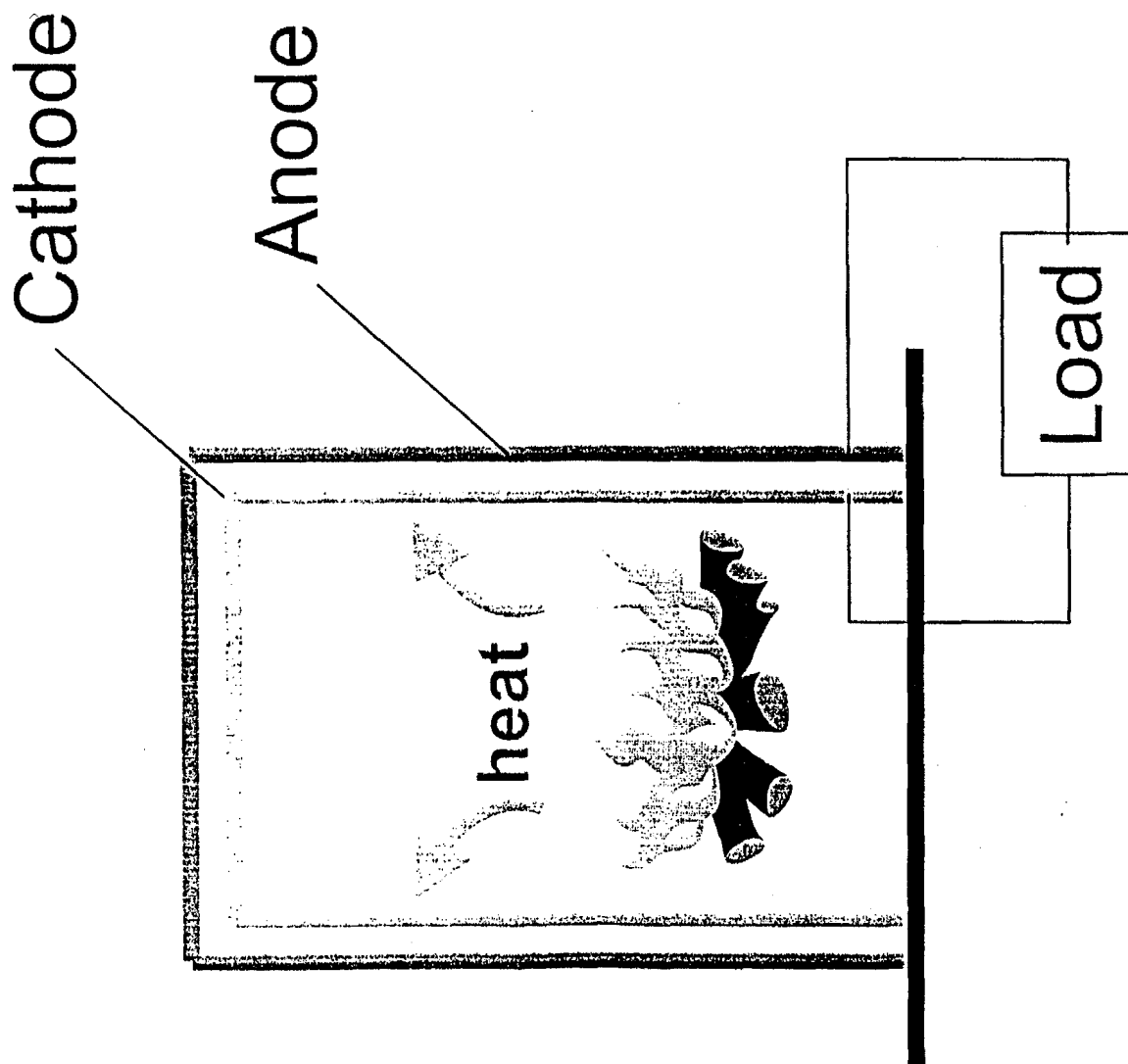


Figure 8. Schematic of a direct power generation device.

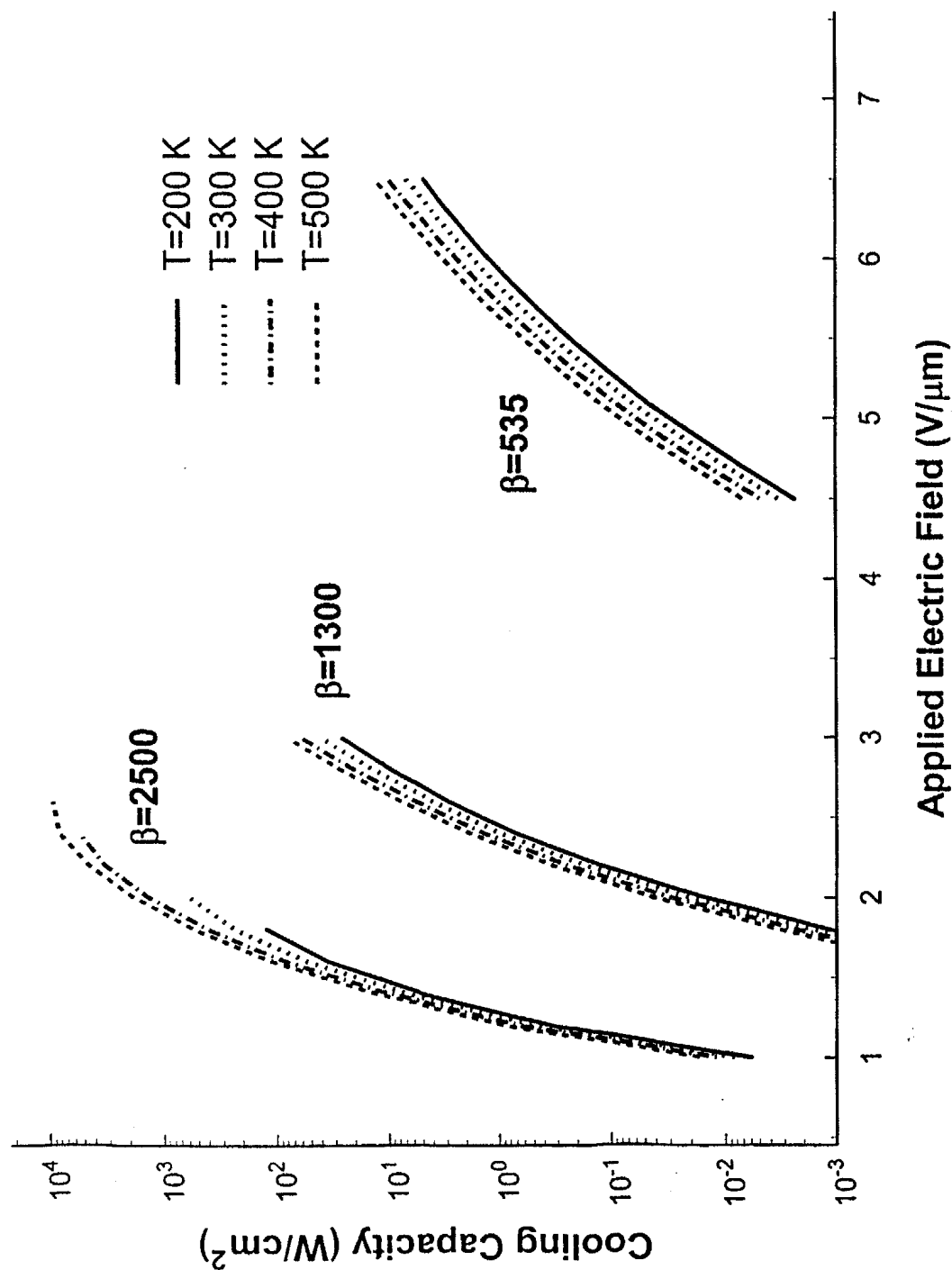


Figure 7. Predicted cooling capacity as a function of applied electric field, field enhancement factor  $\beta$ , and temperature.



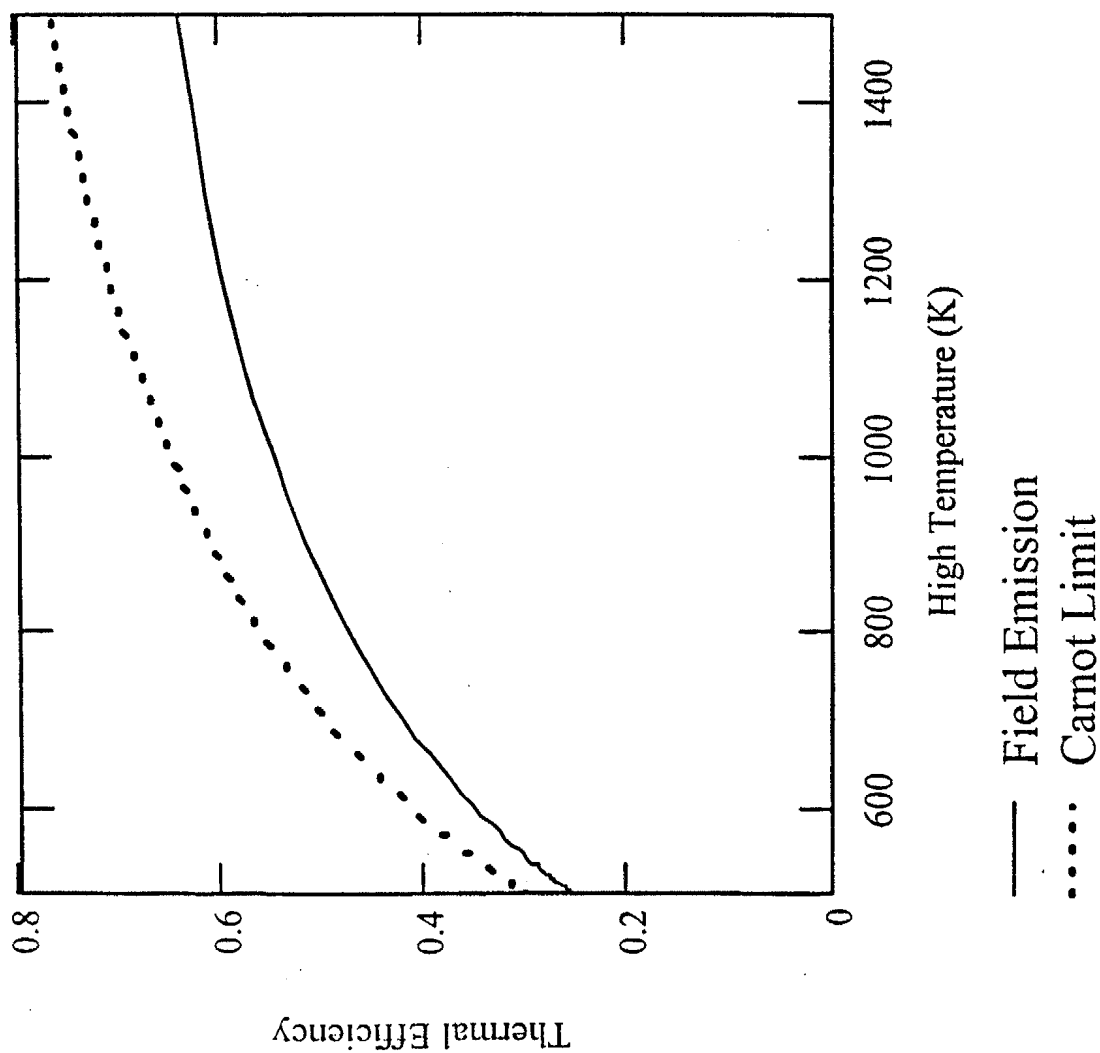


Figure 9. Predicted thermal efficiency of standalone power generation by field emission as a function of hot-side temperature.

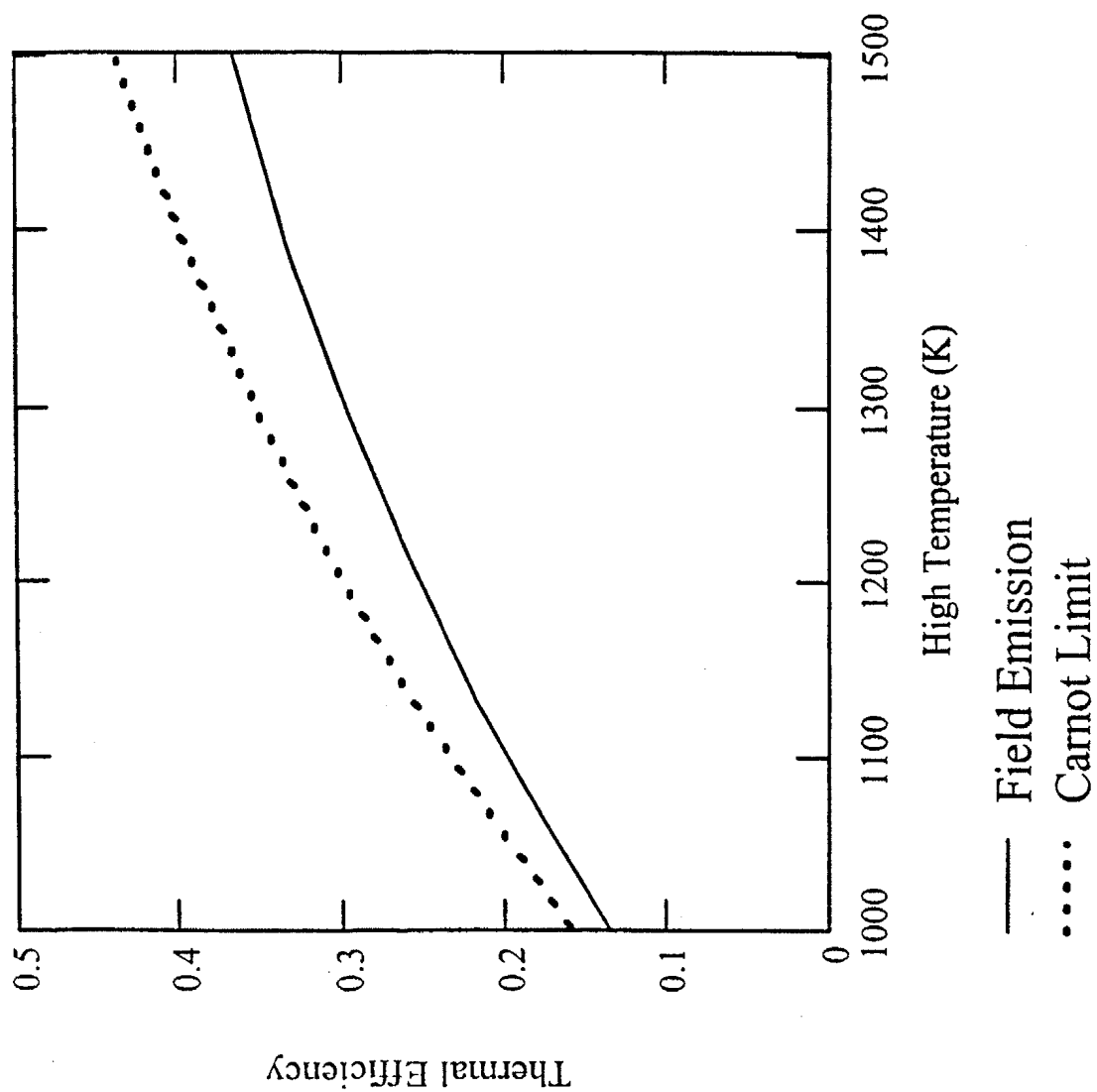


Figure 10. Predicted thermal efficiency of topping cycle power generation by field emission as a function of hot-side temperature.

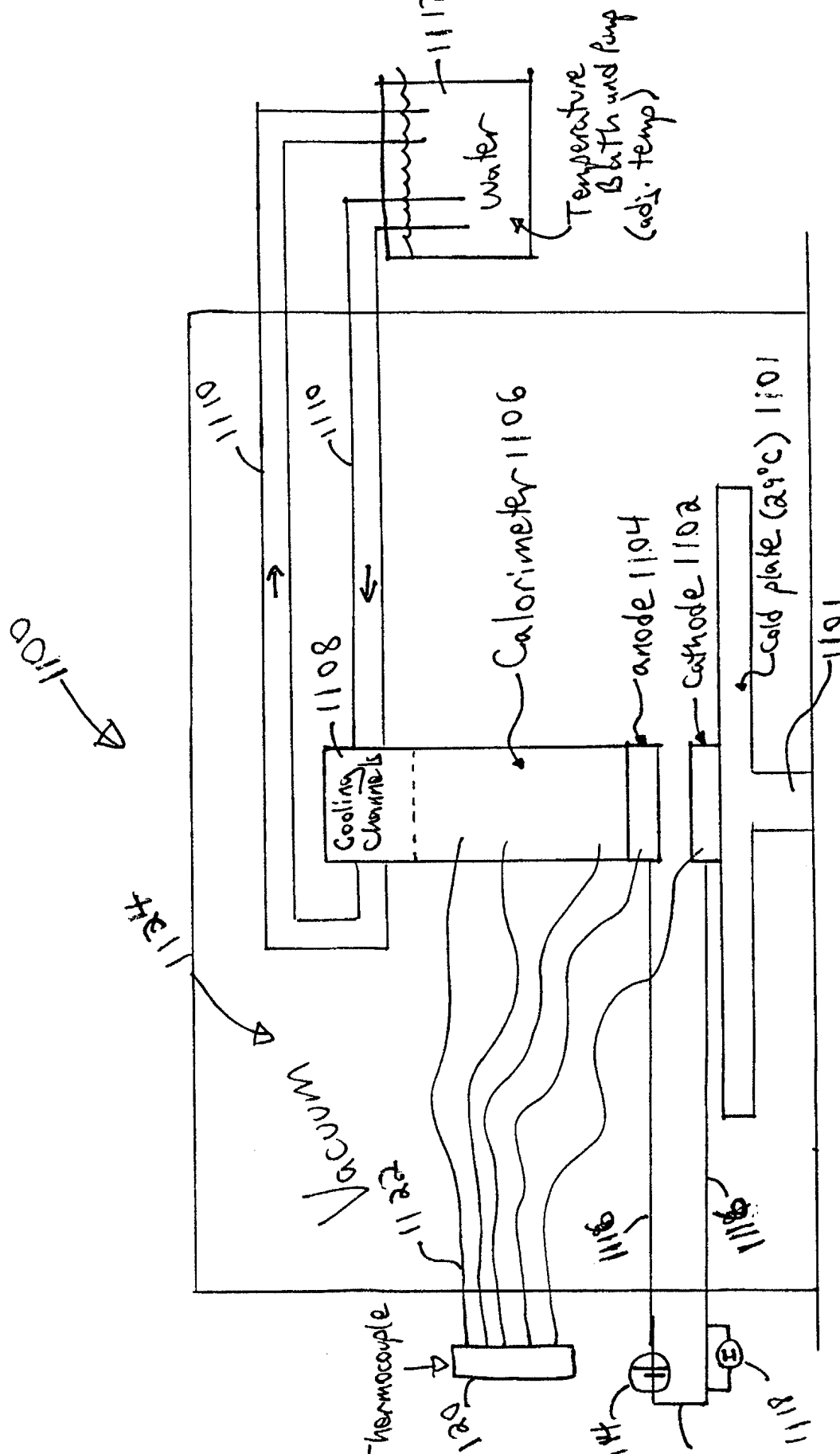


Fig. 11

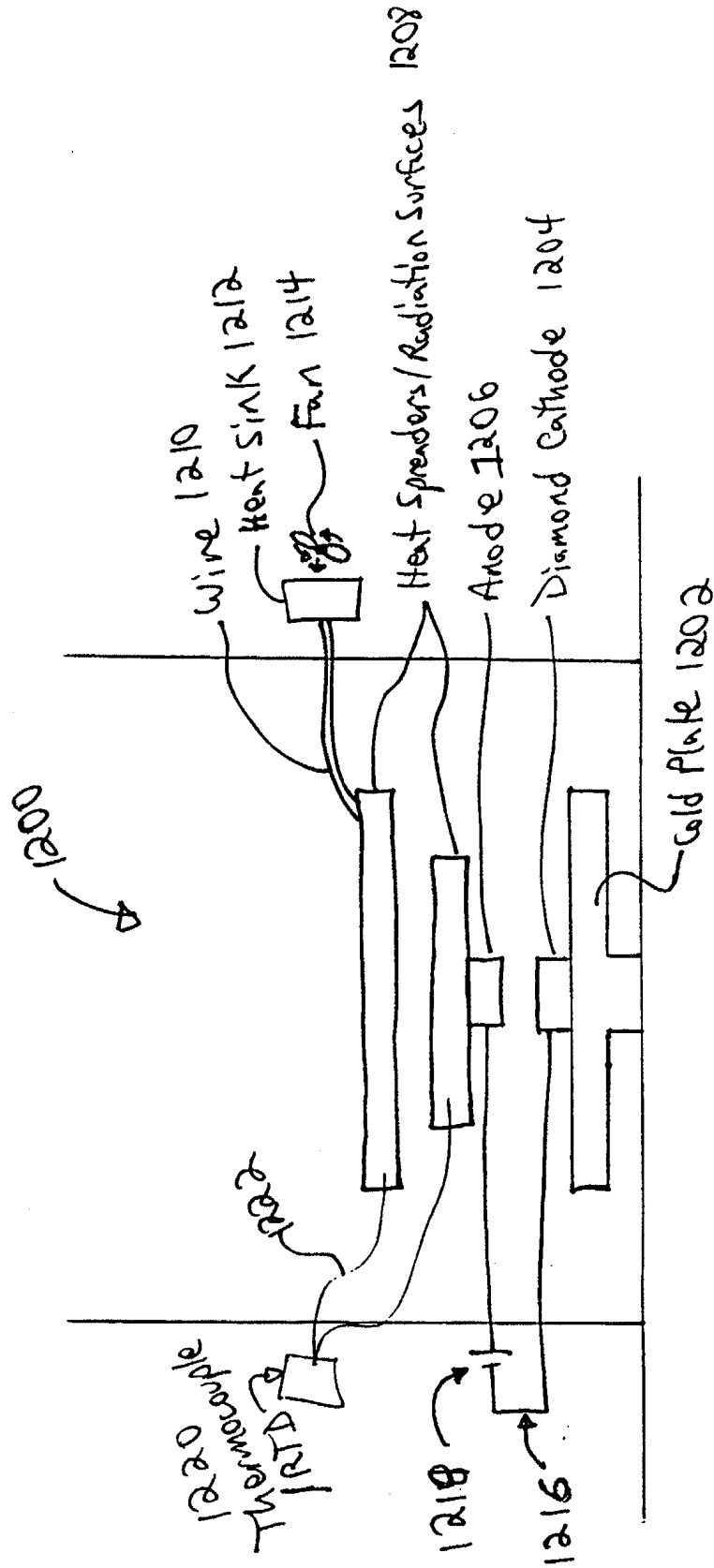


Figure 12

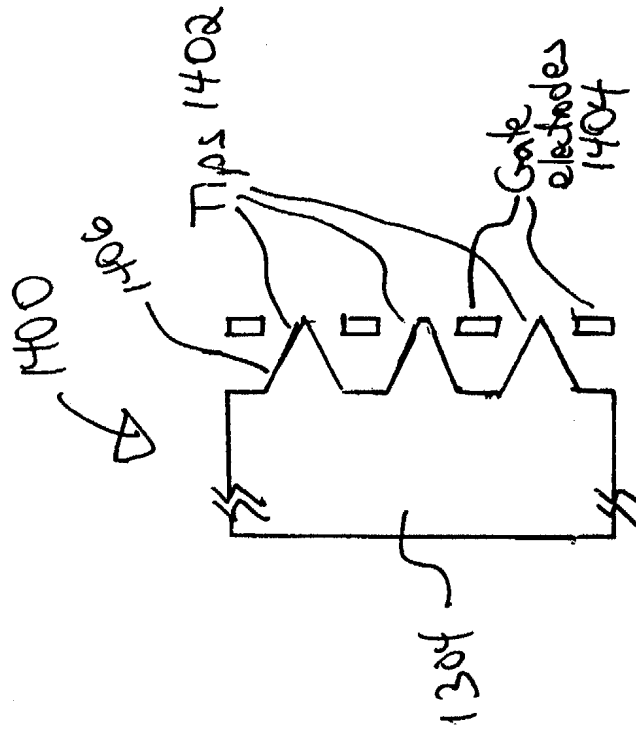


Figure 14

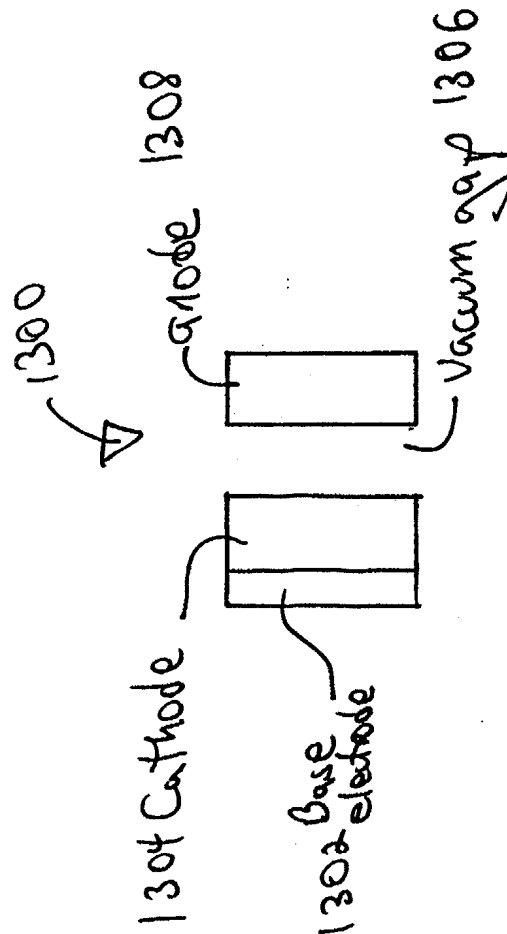


Figure 13